THE IMPACT OF GROUNDNUT TRADE LIBERALIZATION: IMPLICATION FOR THE DOHA ROUND

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Abstract: We use a partial-equilibrium multi-market international model to analyze trade and agricultural policies affecting peanut/groundnut products markets. The model covers four goods (food and crush quality groundnuts, groundnut oil and cake) in 13 countries/regions including a large set of developing countries (Argentina, China, the Gambia, India, Malawi, Mexico, Nigeria, Senegal, and South Africa). Welfare is evaluated by looking at the consumer's equivalent variation, quasi-profits in farming (groundnut farming, livestock), quasi-profit in crushing, and taxpayers' revenues and outlays implied by distortions. We calibrate the model on recent historical data. We analyze several groundnut trade liberalization scenarios. The impact of the reforms is measured in deviation from the recent historical baseline. Trade liberalization in groundnut markets has a strong South-South dimension opposing two large developing countries (India and China) to smaller developing countries mainly located in Africa. Current Chinese and Indian policies substantially depress the world prices of edible groundnuts, groundnut oil and groundnut meal. Following the removal of these distortions, African exporters present in these world markets would gain because they are net sellers of the cash crops. Consumers in China and India would be better off as well with lower consumer prices resulting from the removal of high tariffs more than offsetting the higher world prices of groundnut oil. The cost of adjustment would fall on farmers in India and China who would have to shift to other crops or activities. Crushing in India would also decrease because crushing margins would deteriorate. Net buyers of groundnut products in OECD countries will be worse off. We draw implications for Doha negotiations.

Keywords: Doha, groundnut, peanut, oil, trade liberalization, protection, distortion, negotiations

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Introduction

Until 2002, the former policy debate of groundnut/peanut[1] markets was always conducted in a North-South context, where U.S. farm and trade policies severely distorted world markets, causing important but overlooked distortions in the South. Radical reforms under the 2002 U.S. farm bill have removed many of the worst features of the former U.S. peanut program. Trade barriers were an essential pillar of the former U.S. peanut program, which generously subsidized U.S. growers. With a system of supply controls and price discrimination, U.S. farmers received a very high price for "food" peanuts on infra-marginal output (a rectangle of rents) but a lower price equal to the world price at the margin for peanuts that had to be exported.[2] This scheme was only feasible by limiting imports to minimum levels to force U.S. food processors to buy domestic "food" peanuts. The U.S. government restricted imports through tight tariff-rate quotas under the Uruguay Round Agreement on Agriculture (URAA),

The shift to the new policy was caused by trade liberalization under NAFTA, which acted as a disciplining device for domestic policies. As part of its NAFTA obligations, the United States had to gradually increase TRQ for groundnut import from NAFTA members. The rising imports undermined the domestic price discrimination scheme as cheaper peanuts imports started competing with high-price domestic food peanuts.

As we show later in the paper, the current U.S. policy is now a minor source of distortion in groundnut markets. This policy change in the North has brought forth the significant distortions within the South and the new policy debate in groundnut markets is occurring in a South-South context.

[1]Groundnuts and peanuts are synonyms. We use the latter to refer to U.S. markets and policies, and the former for all other countries and their policies.

[2]The former U.S. peanut program had additional features but the essence of the program was constituted by the two components described in the introduction. See Skinner for a detailed description of the former peanut program.

Trade liberalization in groundnut markets now opposes vested interest in two large developing countries (China and India) to income-generation in smaller developing countries, especially in Africa, hence the potential rift within the South. China and India's policies substantially depress the world prices of the three traded commodities considered in our analysis, thus reduce the potential of farm income generation in Africa. The removal of trade distortions by China and India is essential to ensure an effective trade liberalization of groundnut products markets.

Many developing countries have been reluctant participants in the Doha round. They stand to lose their preferential-trade-partner status as multilateral tariff decrease and greater market access erodes their preferences. However, in some markets such as groundnuts and cotton, many African countries have a comparative advantage that would enable them to compete in the world markets and generate rural income and exports earnings, and alleviate rural poverty (see Baffes for cotton). If not wasted, such opportunities provide these countries with a stake in the Doha round. India and China have other opportunities to reap in the Doha process, especially in services and manufacturing trade in the context of their diversified economies. Successful conclusion of the Doha round will hinge, among other things, on identifying opportunities and tradeoffs palatable to all parties, which allow to overcome the entrenched vested interest in protected markets.

Despite their importance for small developing countries, groundnut product markets have been systematically neglected in policy analysis related to the Doha round using CGE models (Beghin, Roland-Host, and van deer Menbrugghe, Anderson et al.) mostly because of data constraint in the GTAP commodity coverage. Previous partial equilibrium investigations of groundnut policy have assumed exogenous world prices and have narrowly focused on unilateral reforms assuming parametric border prices (e.g., Hattie and Lopez; Rucker and Thurman). Our

paper fills this void. We use a partial-equilibrium multi-market international model to analyze trade and agricultural policies affecting groundnut products markets. The model covers four goods (food and crush quality groundnuts, groundnut oil and cake) in 13 countries/regions (Argentina, Canada, China, EU-15, the Gambia, India, Malawi, Mexico, Nigeria, Senegal, South Africa, the United States, and the Rest of World). Welfare is evaluated by looking at the consumer's equivalent variation, quasi-profits in farming (groundnut farming, livestock), quasi-profit in crushing, and taxpayers' revenues and outlays implied by distortions. We calibrate the model on the most recent historical data. We analyze several groundnut trade liberalization scenarios. The impact of the reforms is measured in deviation from the recent historical baseline.

We show that world trade liberalization, including the removal of trade distortions by China and India, would increase groundnut product prices by 15-20 percent above their current levels. As a result, net buyers of these products in OECD countries will be worse off, but the poorest countries present in these world markets would mostly gain from full trade liberalization because they are net sellers of the cash crop and products. Farm income generation in Africa would be substantial relative to the size of these economies reaching about $125 million of farm profits. Consumers in China and India would be better off as well with lower consumer prices resulting from the removal of high tariffs more than offsetting the higher world prices of groundnut oil. The cost of adjustment would fall on farmers in India and China who would have to shift to other crops or activities. Crushing in India would also decrease because crushing margins would deteriorate. We conclude the paper by drawing implications for the Doha negotiations.

II. Background Information and Policies

Groundnuts are one of the world's main oilseeds crops. They are widely cultivated in developed

and developing countries. World groundnut production grew at around 2.3 percent annually over the last 20 years, driven by a tremendous growth in China. Global export of edible groundnuts increased annually by 2.2 percent, which is in sharp contrast to exports of groundnut oil and meal which declined by 1.0 and 2.5 percent per year, respectively, over the last 20 years despite growing global consumption of these two products. International trade in groundnuts remained thin, with only 5 percent of world production sold in the international market.

Groundnuts provide livelihood and cash income to many poor farmers in the developing world, especially in Sub-Saharan Africa (SSA) and Asia. In Senegal for instance, an estimated one million people (one tenth of the population) are involved in groundnut production and processing. Groundnuts account for about 2 percent of GDP and 9 percent of exports in Senegal (Akobundu). In Gambia, about three-quarters of the farmers grow groundnuts, which occupy 53 percent of the arable land. Recent trade policy changes by major players in groundnut markets make such analysis timely, if not necessary.

China is the world's largest exporter of groundnut (with 32 percent of world edible groundnut exports), followed by the United States (19 percent) and Argentina (10.5 percent). SSA (Senegal, Gambia, Nigeria, Malawi, South-Africa and Sudan) has lost ground in world edible groundnut markets, and collectively accounts for only 5 percent of the world market in 2001, down from 17 percent in 1976. In the groundnut oil market segment however, Senegal is the world's largest exporter but this market has become all the more thin as other vegetable oils are increasingly used as substitutes for groundnut oil. Unlike many other agricultural products traded internationally, world prices of groundnuts have not declined during the 1990s but have fluctuations widely around $850 per metric ton for both edible groundnuts and groundnut oil.

U.S. Policies

With the 2002 farm bill, production quotas are eliminated (with a quota buyout) and the peanut

price support program converted to a system of direct and counter-cyclical payments, and a price floor *cum* production subsidy (non-recourse loans with marketing loan provisions). The key specific features of the new program are the following: (i) all groundnut producers--with or without a history of groundnut production-- now have equal access to a marketing loan program, under which producers can pledge their crops as collateral to obtain a marketing loan rate equal to $355 per short ton. Producers may repay the loan at a rate that is the lesser of USDA-set repayment rate plus interest or the marketing loan rate plus interest, or they can forfeit the loan (Roveredo and Fletcher); (ii) For producers with a history of groundnut production, a new direct and fixed payment of $36 per ton is available. Historic producers are those involved in groundnut production during the period 1998-2001. Eligible production would equal the product of average yield in the base-period and 85 percent of base-period acres. These payments are made regardless of current prices or the actual crop planted, so long as the farm remains in approved agricultural uses; (iii) Producers with a history of groundnut production are also eligible for a new counter-cyclical payment when market prices are below an established target price of $495 per ton minus the $36 per ton direct payment. The payment rate is the difference between the target price ($495 per ton) minus the direct fixed payment ($36 per ton), and the higher of the 12-month national average market price for the marketing year for groundnut or the marketing assistance loan rate ($355 per short ton). Total counter-cyclical payment to each eligible producer is calculated as the product of the payment acres (85 percent of base acres), the base-year average yield, and the payment rate; (iv) Owners of groundnut quota under the previous legislation receive compensation payments for the loss of quota asset value. Payments may be made in five annual installments of $220 per short ton during fiscal years 2002-06, or the quota owner may opt to take the outstanding payment due in a lump sum. These payments are based on the quota owner's 2001 quota, so long as the person owned a farm eligible groundnut quota.

The changes in the U.S. peanut program will affect domestic demand and supply, thus domestic prices and U.S. trade flows in several ways. On the demand side, the elimination of production quotas decreases the price paid by U.S. food processors and thus, increases domestic demand. It also takes away the logic of importing confectionery peanuts to lower the cost of processing food items intensive in peanuts. The lower cost of production of peanut butter/paste in the United States follows the same logic. The incentive to import cheaper peanut paste/butter from Argentina or Mexico has thus been seriously mitigated by the recent changes in the farm program. On the production side, production incentives created by the new Farm Program will vary among different types of producers but the net effect is likely to be an increase in production. The so-called U.S. decoupled payments and counter-cyclical payments do create minimal incentives to increase production and can be viewed as supply-inducing subsidies (Adams et al. 2001).

Groundnut policies in India, China, and Argentina

For all these countries, a general trend since the mid-1990s is a gradual reduction of potentially market distorting direct government intervention in production, marketing and international trade of groundnut products. However, in response to declines in groundnut product prices, India and China often intensify their use of trade policy measures to protect their producers and pursue consumption policy goals.

India removed most restrictions on domestic trade, storage, and export of groundnuts by 1998, and allowed futures trading. This latter decision has permitted an important increase in futures contracts and even a recent use of on-line trading. However, while export groundnut have been freed and imports subject to fewer restrictions, tariffs levels remain very high for all the three groundnut products considered here. As Table 1 shows, tariffs on groundnut and groundnut oil stood at 45 percent, while that of groundnut meal reached 35 percent in 2001. Furthermore,

there are some aspects of the Indian legislation that is costly for producers and users of groundnuts and which creates a great deal of inefficiency in the marketing system. One example is the obligation to sell and purchase groundnut only in the "Agricultural Produce Wholesale Market." This legislation is costly to both farmers and processors because even if they are located very close to each other geographically, they all have to travel to the wholesale market, pay an "agent commission" and other marketing fees before the transaction is processed. Another example of costly legislation is the small-scale reservation policy in groundnut processing, which sets limits on fixed assets in plant and machinery. This policy greatly handicaps domestic processors vis-à-vis foreign competitors since they cannot exploit economies of scale.

As in India, China liberalized to some degree groundnut trade in recent years. Imports of groundnuts, which, up to 1999, were the responsibility of only six state companies, are now opened to the private firms. However, while the government has committed to cap and reduce trade-distorting domestic subsidies as part of its WTO admission agreements, guaranteed prices and government procurement schemes remained in place[3]. Furthermore, groundnut border protection remains high in China, particularly for raw groundnuts. Tariff on raw groundnut was 30 percent in 2001, to which one should add a value-added tax of 17 percent. Tariffs on groundnut oil and groundnut meal were much lower, standing at 9.7 (in-quota) and 5.0 percent respectively. However, a value added tax of 17 percent was levied on groundnut oil.

Argentina's groundnut trade policy contrasts sharply with that of India and China, as almost all the distortions are associated with exports. Until 2001, exports of raw groundnuts were taxed at 3.5 percent while exports of processed products were not taxed. However, as a result of Argentina's recent financial crisis, export retention on groundnuts increased to 20 percent. This

[3]According to FAO, these policies provide little incentive to expand production due to unattractive administrative price levels and greater involvement of private sector in marketing operations. Data on the size of domestic support is not available.

export tax may countervail the positive signal sent to groundnut exporter through the devaluation of peso. Argentina has import tariffs on groundnuts and products, which exhibit some tariff escalation (5, 8 and 13 percent on groundnuts, cake, and oil). These tariffs are redundant since the country is a net exporter of groundnuts products.

Groundnut policies in key African exporters

After decades of extensive intervention in the groundnut sector, African countries have, to a varying degree, undergone market reforms in the 1980s under structural adjustment plans. One of the main objectives of market reforms was to eliminate direct and indirect taxation of farmers that had undermined production incentives in the 1970s and early 1980s and led to excess processing capacities in many groundnut producing countries (Badiane and Kinteh). The reforms have however generally been piecemeal and partial. Governments have generally withdrawn from input markets, which, due to important market failures (e.g., in credit market) and high transaction costs led to difficult access to credit to purchase certified seeds and fertilizer. (Governments have however been more reluctant to liberalize groundnut processing, for which privatization efforts started only recently (Senegal, Gambia).

African governments have traditionally used pricing policies as levers to conveniently tax or subsidize farmers based on countries' industrial policy and political circumstances. Taxation of groundnut farmers was high in the 1970s but has been reversed since the early 1990s in most countries when world prices espoused a declining trend (Badiane and Kinteh 1994). [4] In Senegal and Gambia, the main rationale for state intervention in the groundnut sector has been to safeguard the viability of state-owned processing mills. Consequently, the share of groundnut farmers in the export price has consistently been lower than 60 percent in these two countries

(Badiane and Gaye). This policy has been counter-productive, since it has led farmers to bypass large public processing companies, leading to increased excess capacities and financial difficulties.

With regard to trade policies, there are wide differences among African traditional groundnut exporters. Senegal and Malawi apply tariffs to processed groundnuts, to encourage in-country processing of groundnuts (oil production in the case of Senegal). In contrast, Gambia has a liberal trade policy, with no export taxes or import tariffs. South African tariff structure exhibits a slight escalation, with processed groundnuts subject to a tariff of 6 percent while unprocessed groundnuts enter duty free. In Senegal and Gambia however, unofficial cross border trade is significant, with farmers frequently crossing the border to and from Senegal, depending mainly on respective producer prices and domestic supply levels.

Trade Barriers in Major High-Income Groundnut Importers

In spite of a general pattern of moderate tariff escalation, tariff barriers for groundnuts are not a major obstacle in high-income major importers: the two largest groundnuts importers in this category, the EU and Canada, have a zero tariff for unprocessed groundnut and low processed groundnut tariffs for GSP and LDC countries. Assessment of market access in these countries should however take into account the strict quality standards and SPS regulations (Otsuki, Wilson, and Sewadeh). In contrast to the EU and Canada, Japan and especially Korea have a higher tariff regime for groundnuts.

III. The Groundnut Product Model

This section draws extensively on Beghin and Matthey. We refer the interested reader to the

[4]Taxation of producers was direct, i.e., when marketing boards or similar agencies captured the rent equals to the difference between net world price and producer price, or indirect, via real exchange rate appreciation. This taxation was generally

latter paper, which provides a detailed and technical description of the model and its calibration.

Groundnut markets

Groundnut supply

For exposition sake, we abstract from a country subscript when presenting the structure of the model. We make it clear whenever aggregation over countries is necessary. In each producing country, the aggregate supply of groundnuts, GS, is function of the current domestic price P_{gavrg}, the average of the domestic farmgate prices for food-groundnuts production, FGS, and crush-groundnuts production, CGS, or $P_{gavrg} = (CGS/GS)P_{cg}+(1-(CGS/GS))P_{fg}$. A linear specification is chosen for the supply:

(1) $GS = b_{go}+b_{g1} P_{gavw} = b_{go}+b_{g1}[(CGS/GS)P_{cg}+(FGS/GS)P_{fg}]$.

Share coefficients (CGS/GS), and (1-(CGS/GS)), are endogenous and reflect the composition of aggregate output. Estimates of parameters $\mathbf{b_g}$ come from the econometric or consensus estimates of supply elasticities depending on availability. This convoluted approach to modeling the aggregate supply decision is motivated by the lack of data on individual land allocation and yield for the two types of groundnuts in most countries. This approach mimics two separate production decisions for which individual data are not available and which are "revealed" at harvest time. It is clear that if the price of food-quality groundnut rises relative to the price of crush-quality groundnuts, then farmers will exert more effort to increase the average quality of their crop resulting in a larger share of food-quality groundnuts in their aggregate groundnut crop.

We explain next how domestic price P_{fg} is determined. The farmgate price of food-groundnuts is function of the world price of food groundnuts expressed in local currency, P_{gw}, inclusive of distortions affecting the producer at the farm gate level, τ_g, and transaction cost affecting the farmgate price from the border, tc_g. The domestic producer price for food

mitigated by input subsidies and border protection.

groundnuts is $P_{fg} = \psi\ (P_{gw} + \tau_g) + tc_g$. Parameter ψ represents a price transmission/pass-through scalar. If $\psi = 1$ then full transmission is assumed. We use values between 0.4 and 1 for this parameter in the simulations. The imperfect pass-through of world prices to domestic markets is consistent with quality differential across countries, since the world price (so-called Rotterdam Price) corresponds to the best available quality worldwide.

The crush-quality groundnut price is determined by the domestic equilibrium for crush-quality groundnuts, since the latter are treated as a nontraded good market. Domestic supply satisfies the crush-quality groundnut demand. Relative to crush-quality, food-quality groundnuts receive a quality premium. This price premium is endogenous and driven by cost to reflect the relative marginal cost of food-quality groundnuts.

Price P_{gw} is determined by the equilibrium of the world market for food-groundnuts. Price P_{cg} is determined by the domestic market equilibrium for crush-groundnuts (demand = supply) as it is considered a nontraded good. The demand for crush-groundnuts is explained below.

The change in welfare of groundnut producers is measured by the change in realized quasi- profit, from the initial situation reflecting the current distorted prices to a set of new prices. This welfare measure is:

$$(2)\ \Delta\mathbf{\Pi}_p = \int_{P_{gavrg}^0}^{P_{gavrg}^1} GS(P_{gavrg})\, dP_{gavrg}.$$

where superscripts 0 and 1 indicate old and new situations.

Total crush-quality groundnut demand

The total demand for crush-quality groundnuts, TGCD, is a sum of demands coming from seed use, GSEED, and crushing industry, GCD:

$$(3)\qquad TGCD = GSEED + GCD.$$

Seed demand The seed demand is assumed to be driven by price of groundnuts and the expected production requirement for the year, which for simplicity is assumed to be equal to the actual output for the year. Hence, we assume instantaneous adjustment of seed demand to concurrent production changes. We also assume that the seed demand reflects a pure agronomic constraint and we do not consider substitution with other inputs in groundnut production:

(4) $GSEED = \alpha_{s0} + \alpha_{s1}GS + \alpha_{s2}P_{cg}$,

with α_{s0} denoting the intercept, α_{s1} denoting the seed requirement per unit of output, and α_{s1} denoting the price response of seed demand.

Crush demand The crush demand is driven by groundnut oil demand and/or by cake demand. Given the joint product of oil and cake and the positive economic value attached to cake, the derived demand from crushing reflects both groundnut oil and its byproduct cake. The derived demand for crush groundnuts is driven by the crush margin, b_{crush}:

(5) $GCD = GCD(\ b_{crush}\ )$ with $b_{crush} = \gamma_{oil}P_o + \gamma_{cake}\ P_{cake} - P_{cg}$.

Parameters γ_{oil} and γ_{cake} reflect the jointness of cake and oil in crushing (the oil and cake produced per unit of crushed groundnut).

Food-quality groundnut demand

Food-quality groundnut demand, GFD, represents a single aggregate food use representing several food items in groundnut-equivalent (prepared groundnuts, groundnut butter, candies, etc). The final demand for food-groundnuts is part of an incomplete final demand system for food-groundnuts and groundnut oil, and an aggregate other goods based on the calibrated Linquad demand system (LaFrance; Beghin Bureau, and Drogué).[5] The system explains final consumption decisions for the two groundnut goods as determined by corresponding prices

[5]Some other oils could be easily added to the demand system, if ever an expanded investigation covered other oils (soy, sunflower, and rapeseed oils).

described in a vector $\mathbf{P_{pg}}$, $\mathbf{P_{pg}} = (P_{gg}, P_o)$, and income, M. The demand is

(6) $GFD = GFD(P_{gg}, P_o, P_z, M)$.

P_z describes the price of an aggregate representing all-other goods. The parameterization of GFD with the Linquad demand system is explained below in the section dedicated to the final consumer. The consumer price P_{gg} is the world price of food-groundnuts inclusive of distortions, d_{gg}, affecting consumers and a price wedge dictated by transaction cost, tc_g. A net importer status would imply an additional transportation margin, a_{tg}, and $P_{gg} = P_{gw}+d_{gg} + tc_g + a_{tg}$ in the latter case.

Groundnuts domestic market equilibrium

The crush-groundnut domestic market equilibrium is reached when the supply and demand for crush groundnuts are set equal, or TGCD = CGS.

For food groundnuts, the domestic equilibrium is reached with trade:

(7) GFD-FGS = FGnetrade.

Net trade, FGnetrade, could be either imports or exports.

Food-groundnuts world market equilibrium

The sum of excess demands over all countries is equal to zero and determines the world price for food-quality groundnuts.

The crushing industry

Oil and meal production[6]

We make the usual assumptions of fixed proportion in the jointness of cake and oil production, and price-taking in oilseed crushing. As the crush margin increases, the demand for crush groundnuts increases. Market equilibrium between the horizontal supply of oil and cake and their respective market demands is such that equation (8) is satisfied. If the marginal cost were higher

than the marginal price, a decrease in quantity of groundnuts crushed would induce a joint movement along the demands for oil and cake to match the new production levels of oil and cake, and increase the industry price of oil and cakes re-establishing equilibrium.

The oil supply, GOS, and the cake supply, CakeS, are GOS = γ_{oil}GCD, and CakeS = γ_{cake} GCD. The welfare of the crusher is just the quasi profit from crushing. The change in welfare between two policy regimes is just the difference in profits between the two states of the world:

(8) $\Delta\mathbf{\Pi}_{crush} = GCD^1(b^1_{crush}) - GCD^0(b^0_{crush})$,

where margin b^i_{crush} is evaluated at prices prevailing in period i.

Groundnut oil demand

Groundnut oil demand is a final demand coming from the consumer. Groundnut oil is one of two groundnut goods the final consumer purchases as explained above in the section on food-groundnut demand. The oil demand is structured similarly as the demand for prepared groundnuts is:

(9) $GOD = GOD(P_{gg}, P_o, P_z, M)$.

The calibration of GOD is explained in the section on the final consumer.

Cake demand

It is a derived demand from livestock production. Cake or meal demand is an output-constant demand, which is function of livestock numbers (aggregate livestock animal units), LAU, the price of cakes and the price of other feed products, P_{feed}. We assume that the animal unit numbers and prices of competing feed products are unaffected by the policy reform and abstract away from them in the policy scenario. The cake demand is

(10) $CakeD = CakeD(P_{cake}, P_{feed}, LAU)$.

Oil and cake domestic market equilibrium

[6]We use cake and meal as synonyms.

We assume trade in groundnut oil and cake is an excess demand/supply and provides closure in these markets:

(11) GOD-GOS = GOnetrade, and

(12) CakeD-CakeS = Cakenetrade,

with GOnetrade and Cakenetrade representing the country import from or export to the world market for the two products. The link between the world price in domestic currency and domestic price for these two products is done via a price transmission equation similarly to the food-groundnut price with scalars ψ_{cake} and ψ_{oil}. The equations are:

(13) $P_{cake} = \psi_{cake} (P_{cakew} + \tau_{cake}) + tc_{cake}$, and

(14) $P_o = \psi_{oil} (P_{ow} + \tau_o) + tc_o$,

with parameters tc and τ representing price wedge for transaction costs, and distortions.

Oil and cake world market equilibrium

The sum of excess demand over all countries is equal to zero and determines the world price for oil and cakes, which are traded commodities in the model and for which systematic trade data exist.

Treatment and calibration of final consumption

We follow the demand calibration approach of Beghin, Bureau, and Drogué. We have a representative consumer with expenditure function e(**P**, U) with **P** being the vector of relevant consumer prices, and with U denoting utility. We are interested in a vector of two groundnut-containing goods **GGD** = (GFD, GOD), that is prepared groundnuts, and groundnut oil, with prices $\mathbf{P_{pg}} = (P_{gg}, P_o)$. We have the aggregate other goods, Z, for completeness with price P_z. The approach allows us to derive an exact welfare measure from an incomplete demand system. The price vector **P** is be decomposed into $\mathbf{P} = (P_{gg}, P_o, P_z)$, and income is denoted by M, with subscripts indicating the respective commodities. The Linquad expression of the vector of

Marshallian demands for agricultural and food goods is:

(15) $\mathbf{GGD^M} = \boldsymbol{\varepsilon} + \mathbf{V}\,\mathbf{P_{pg}} + \boldsymbol{\chi}\,(M - \boldsymbol{\varepsilon}'\mathbf{P_{pg}} - 1/2\mathbf{P_{pg}}'\mathbf{V}\,\mathbf{P_{pg}} - \delta(p_z))$,

corresponding to the expenditure function

(16) $e(\mathbf{P_{pg}}, \mathbf{p_z}, \theta) = \mathbf{P_{pg}}'\boldsymbol{\varepsilon} + \frac{1}{2}\mathbf{P_{pg}}'\mathbf{V}\,\mathbf{P_{pg}} + \delta(p_z) + \theta(P_z, u)e^{\boldsymbol{\chi}'\mathbf{P_{pg}}}$.

The elements of vectors, $\boldsymbol{\varepsilon}$, and $\boldsymbol{\chi}$, in equations (15) and (16), together with the elements of matrix **V** are calibrated using a procedure described in detail in Beghin, Bureau, and Drogué.

Welfare analysis

Consumer

Equations (15) and (16) lead to an equivalent variation, EV, equal to

(17) $EV = [M - \boldsymbol{\varepsilon}'\mathbf{P^1_{pg}} - 0.5\,\mathbf{P^1_{pg}}'\mathbf{V}\,\mathbf{P^1_{pg}}]\exp[(\boldsymbol{\chi}'\mathbf{P^0_{pg}} - \boldsymbol{\chi}'\mathbf{P^1_{pg}}] - [M - \boldsymbol{\varepsilon}'\mathbf{P^0_{pg}} - 0.5\,\mathbf{P^0_{pg}}'\mathbf{V}\,\mathbf{P^0_{pg}}]$.

We compute the change in expenditure, which would keep utility at the free trade utility level under the distorted program prices. Superscripts 0 and 1 denote initial distorted and final free-trade prices.

Taxpayers

With policy reforms, there is a potential change in tax revenues food-groundnut, oil, and cake trade. These losses are captured by the accounting identity (new flow*new tax rates*new prices-old flows*old tax rates*old prices).

Net welfare gains from policy reform

Net welfare is defines as the EV of the consumer net of losses/gains to groundnut producers, changes in livestock producers' surplus, changes in profits in crushing, and gains (losses) for taxpayers.

IV. Calibration and Policy Scenarios

Calibration

The country coverage includes Argentina, Canada, China, EU-15, the Gambia, India, Malawi, Mexico, Nigeria, Senegal, South Africa, the United States, and an aggregate Rest of World. Commodity coverage includes four commodities: food-quality groundnuts crush quality groundnuts, groundnut oil, and groundnut cakes.

The typical groundnut quality premium is such that P_{cg} is between 40 and 50 percent of P_{fg}. As more food groundnuts are produced relative to crush groundnuts, the premium for food groundnuts increases to reflect the higher relative marginal cost of food-quality groundnuts. We calibrate the two prices as follows: $P_{cg} = P_{fg}$ (0.42+0.05 CGS/GS)), which reflects the stylized facts of the two prices' relationship.

We calibrate the model for 3 years (1999/2000, 2000/01, and 2001/02) on historical data using MS Excel. Then the impact of policy scenarios is measured in deviation from the historical baseline expressed in 1995 constant U.S. dollars. We use USDA-FAS Production, Supply, and Distribution (PS&D) data to calibrate production, utilization, and trade of groundnuts and products. The latter dataset is completed by FAO data whenever USDA-FAS PS&D is not available. The macro data (GDP, GDP deflator, exchange rate) come from the IMF-International Financial statistics and the World Bank's World Development Indicators database. The baseline and simulations were run for 3 years (1999-2001) and averaged out.

The policy instrument coverage in the analysis reflects the current (2002) level of trade and domestic policies presented in the policy section of the paper. The policy coverage allows for the analysis of the separate impact of border measures on groundnuts, oil, and cake in all countries, their combined effects, and domestic policy such as the new U.S. peanut policy. Table 1 presents the parameterized policy instruments by country. The coverage of border measures is extensive. The coverage of domestic distortions (farm support, other taxes/subsidies) is spottier

despite a long search. Domestic distortions are documented for OECD countries but are harder to collect for developing economies, especially when parastatals are involved in marketing and trade. We cover the major features of the 2002 U.S. farm bill on peanuts (loan rate and counter-cyclical payments based on target price). Trade protection in the United States is high but not effective since preferential imports of peanuts could enter at zero tariffs and the current TRQ is under-filled. The United States is a low-cost net exporter of peanuts and products. Hence, the high tariffs on out-of-quota peanut imports are not effective.

Domestic price wedges such as value-added taxes is available for a few countries (e.g., China), but not systematically covered. India and China have the highest protection levels including a strong protection of value-added activities. Given the strong governmental presence in groundnut markets in these two countries, it is hard to know exactly what protection levels are provided to farmers. Some African countries have some border protection on oil and prepared groundnuts product to protect their domestic value-added activities.

The various supply and demand elasticities used in the model are detailed in Beghin and Matthey. Most of the elasticities come from the FAPRI elasticity database and are a combination of econometric and consensus estimates. Both demand and supply are price-inelastic. Income elasticities are positive but smaller than one.

Policy reform scenarios

We analyze multiple scenarios. First, we consider full multilateral trade liberalization for groundnuts, cake, and oil, with and without the removal of the U.S. peanut program. We label these two scenarios FMTL&US, and FMTL. Then we consider multilateral groundnut trade liberalization, again with and without the removal of the U.S. farm peanut program (GMTL&US, and GMTL scenarios); Then we consider full trade liberalization in the two largest and most distorted groundnut markets, China and India (CIFTL scenario). We report results on these five

key scenarios in Tables 3 to 7. All results regarding changes in price and physical flows are reported in percent change from the baseline. Changes in welfare are reported in 1995 PPP U.S. dollars (purchase power parity holding in 1995) in Table 8. The simulations were run for the 3 years (1999-2001) and averaged out. We report the impact in levels and then in proportional changes (3-year average of proportional impacts) in the last column of Tables 2 to 6.

V. Results

The two full trade liberalization with and without the removal of U.S. farm policy, FMTL&US and FMTL, bring strong price increases for all three products, 19 percent for groundnuts, 18 percent for groundnut cake, and 16 percent for groundnut oil, as shown in Tables 2 and 3. For the large protectionist countries (China, India), the net effect the groundnut price increase and removal of protection is beneficial to final users of groundnuts, other things being equal. Groundnut imports expand in these countries. For countries with moderate or no protection prior to reform, the net impact (tariff removal and terms of trade) is an increase in domestic prices of food and crush groundnuts handicapping groundnut users (final consumers, crushers). These substantial terms of trade effects have a large impact on trade and complicate the welfare impact of the reforms since allocative efficiency gains can be offset by large price increases originating in the post-reform world markets.

This welfare impact of the FMTL&US and FMTL reforms is further influenced by the change in the groundnut oil price, which affects the crush margin. In countries with high protection of the oil and/or meal sectors (e.g., India), the oil and cake tariff removal, net of the world price hike, induces lower domestic prices for these two products and reduces crush margins. As a result of the lower crush margin, the domestic excess demand for oil and cake increases (reduced crush, larger local demand for products).

By contrast, countries with moderate or no protection in their oil (and cake) market face a net price increase for oil (and cake) after full trade liberalization. Their final consumption of these value-added products decreases, and crushing increases as their crush margin improves with the reform. Specifically, crush margins deteriorate in the EU, India, Malawi, Senegal, and the United States. However, margins improve in China, Gambia, Nigeria, and South Africa. Countries facing deteriorating margins but which have a competitive groundnut production expand their production and exports of groundnuts (e.g., Senegal, the United States) but reduce their exports of processed products.

As shown in Tables 2 and 3, trade patterns change dramatically, China and India experienced trade reversal becoming large importers of groundnuts. Further, India becomes a large importer of cake and oil, because of the lower domestic price in these sectors and reduced crush. The first two columns of Table 7 show the welfare impact of these two reforms. The aggregate net welfare effects of FMTL&US and FMTL amount to about 562 and 559 million dollars at 1995 prices, respectively. China and India experience the largest welfare gains, not surprisingly since they have the two most distorted groundnut product markets. China's welfare gains are about 361 million dollars, whereas India's' gains are about 147 million dollars. The "moderate" world welfare effect first comes from offsets (some countries gain in national welfare, whereas some others lose, chiefly the EU-15). Further, for many countries besides China and India, individual net gains/losses are moderate, mostly because of the small size of the three markets and their price-inelastic nature, which bring large transfers but small deadweight losses. Indeed, substantial transfers occur between consumers, crushers, and producers. These transfers offset each other.

Price effects induced by the reforms have a similar impact (large welfare rectangles and small triangles), including in countries with undistorted markets. For example in Nigeria,

following FMTL, groundnut producers gain 75 million dollars of quasi-rents; consumers experience welfare losses of 70 million dollars because of higher oil and processed groundnut prices; crushers gain 20 million dollars; meal users (feed users) lose about 4 million dollars. The country in aggregate is better off by 22 million dollars.

Under multilateral trade liberalization for all three products, the removal of the U.S. program does not matter much in terms of its impact on trade flows, terms of trade or welfare. This result hinges on the fact that the price floor established by the U.S. loan rate is not effective because of the strong price effects of trade liberalization. The only remaining production distorting element is the fixed payment (fully coupled in our model), which is small. Results under both scenarios (full trade liberalization (FMTL), and FMTL&US) are qualitatively identical, except for the United States, which experience additional welfare gains of 5 million dollars for the removal of its domestic distortions (gains to U.S. taxpayers net of losses of U.S. producers).

The world price impacts of the FMTL scenario are identical to those of FMTL&US (19 , 18and 16 percent respectively for groundnuts, cake and oil). Similarly trade flows are barely affected by the removal of the U.S. domestic program under free trade. U.S. peanut exports are about 11,000 metric tons lower in the FMTL&US scenario as compared to their level in the FMTL scenario. Given that our parameterization of U.S. farm policy assumes full coupling of payments received by producers to production, our assessment provides an upper bound on the effect of the current U.S. peanut program.[7]

Many debates of the Doha round of the WTO evolve around narrow agricultural

[7]We also ran a U.S. distortion removal scenario under existing trade distortions. We obtain a 0.13% increase in the world price of groundnuts and virtually no increase in world cake and oil prices. U.S. peanut exports decrease by 10 percent or about 20,000 mt. Hence unlike in the case of some other commodities subsidized by U.S. taxpayers and consumers (e.g., rice, cotton, sugar), the impact of the current U.S. farm program on groundnut world price and trade is nearly negligible.

negotiations. Hence, it is useful to assess what a narrow agricultural liberalization would achieve relative to a full trade liberalization encompassing value-added products (oil and cake). The GMTL&US, and GMTL scenarios consider this type of reform and their impacts are shown in Tables 4 and 5 and in the third and fourth columns of Table 7. Much is achieved by groundnut trade liberalization alone, but with a large second best component since distortions are present in the value-added markets. In these groundnut liberalization scenarios, the price of cake and oil is hardly affected and crush margins are primarily affected by changes in groundnut prices. Margins improve in India and China, but deteriorate in countries with no or small oil and cake distortions. Consumer welfare implications are also different in these groundnut trade scenarios. In highly protected oil markets, oil prices are higher under the groundnut trade scenarios (GMTL scenarios) than they would be under all-product trade liberalization (FMTL scenarios). In countries with no oil distortions, prices roughly remain as their baseline level and consumers do better under the groundnut trade liberalization than under FMTL scenarios. For the latter reason, the Rest of the World fares much better under GMTL scenarios than under the FMTL scenarios.

By contrast African economies do much better with the FMTL scenarios than they would do with groundnut trade liberalization reforms. The potential Africa-5 welfare gains double moving from GMTL scenarios to FMTL ones.[8]

If China and India liberalized alone (CIFTL scenario), the qualitative results of the FMTL scenarios would hold. What is striking in this last scenario is the importance of China and India's distortions in the welfare, trade, and price effects. As suggested by Table 6 and the last column of Table 7, FMTL really hinges on the removal of distortions in China and India. With the implementation of CIFTL, world price increases for the three products would be substantial: nearly 17 percent for groundnuts, 18 percent for meal, and 16 percent for groundnut oil. The

major welfare differences occur in the Rest of the world where consumers do worse than they would under the GMTL, since oil prices are higher but better than under FMTL since groundnut prices are not as high in the CIFTL scenario as they are in the FMTL one. Africa-5 improves its lot in aggregate but not as well as it would under the FMTL scenario, since groundnut prices are not as high and because Africa-5 own distortions are still in place.

VI. Policy Implications and Conclusions

The groundnut market has been historically distorted by heavy government intervention in the United States, the only country in the North with a large stake in groundnut markets (Rucker and Thurman). The new U.S. Farm Bill has suppressed many if not most unsustainable features of the previous farm legislations, but has introduced new distortions with potential to depress world market prices and subsidizing U.S. groundnut exports. However, we find that the current U.S. domestic peanut program is now mostly a U.S. domestic issue, unlike U.S. domestic policy for other products (e.g., dairy, rice, cotton, sugar). The distortion of groundnut product markets is essentially a South-South affaire and debate. The remaining tariffs in the United States are high but redundant because the country is a net competitive exporter of high- quality groundnuts.

Developing members would gain little by "forcing" further U.S. domestic policy reform unless groundnut prices fall to very low levels. Then the U.S. policy would further destabilize world prices given its anti-cyclical nature. U.S. producers actually would benefit from multilateral trade liberalization in groundnuts product markets. Hence on this very instance of groundnuts, free traders in the South have a natural ally in the North just on mercantilist reasoning.

China and India have become more prominent protectionist forces in groundnut markets.

[8] Africa-5 denotes our aggregate of the Gambia, Malawi, Nigeria, Senegal, and South Africa.

India has a long track record in agricultural distortions and closed borders. China made major concessions under the terms of accession to the WTO, but keeps subsidizing domestic valued-added activities, such as crushing, in one way or another. In India and China governments have succeeded in stimulating production and export and capturing a growing share in the international market at the cost of major distortions in world markets and at home.

The large distortions introduced by these countries depress world market prices and impose large welfare losses on themselves. Worse, they impose sizeable welfare and agricultural income losses among smaller producing and exporting countries, mainly in Africa, hence our title. The removal of trade distortions by the two largest developing economies (China and India) is essential for a successful reform of groundnut products markets.

Following multilateral trade liberalization, net buyers of edible groundnuts, groundnut oil and groundnut meal will be worse off but as we show, the poorest countries present in these markets would mostly gain from full trade liberalization. Although net world welfare effects of liberalizing these three markets are moderate, they are still significant for small agrarian economies such as Malawi, Senegal, and Gambia. Hence in the context of poverty alleviation liberalizing these markets would induce sizeable welfare gains in these countries.

As a block, the OECD countries would experience welfare losses after full trade liberalization (moderate gains in the United States offset by consumer losses in the EU-15, Canada and Mexico). Mexico, Canada, and the EU-15 lose from the trade liberalization, because they have limited distortions in these markets and are penalized by the price increases for the three products.

In the two large developing economies (China and India) gains to consumers are partially offset by losses to producers under full trade liberalization. Yet, net buyers of groundnut products would be unambiguously better off in these two countries. Groundnuts and groundnut

oil are generally not central staple commodities such as rice, except in a few countries or regions. For example, groundnut oil is the main vegetable oil in southern China. In these few regions, consumer welfare gains would be more significant as we show that these transfers are large in the latter country and India.

The simulations also show that beyond, agricultural trade liberalization, the liberalization of the value-added markets is essential to achieve larger welfare gains in African countries. Although the bulk of the world welfare gains occur with groundnut trade liberalization, the additional removal of distortions in value-added markets doubles net welfare gains in the African region via larger profits to groundnut producers, crushers, and exporters.

African countries modeled in our trade liberalization analysis (The Gambia, Malawi, Nigeria, Senegal, and South Africa) would experience aggregate welfare gains of 72 million dollars with Senegal and Nigeria reaping most of these gains. Groundnut and groundnut oil consumers in Africa, tend to be urban whereas groundnut production generates income in rural areas as a cash crop. In that respect, African farmers modeled in our analysis gain about 124 million dollars of profits. These figures are significant in the context of small African economies, but do not represent a silver bullet to lift the rural sector in these countries. The Rest of the World fares much worse in the full trade liberalization scenarios (FMTL and FMTL&US) relative to groundnut trade liberalization, because its consumers are penalized by the higher price for groundnut oil induced by the former scenarios.

Identifying globally superior policy options is not difficult. However, the feasibility of reforms depends on the power of vested interests and the ability of governments to identify tradeoffs and politically feasible packages that will allow them to continue to pursue multiple goals in a more efficient manner. Based on our analysis, acceptable concessions could be struck for African members to benefit from liberalization of markets such as groundnuts and cotton, in

order to mitigate the withering of preferential treatments. For China and India, concessions on groundnuts could be offset by potential mercantilist gains in other agricultural markets (e.g., rice, or dairy), or other sectors such as services and manufacturing.

Our quantitative assessment has some limitations and abstracted from important problems. African producers need to reduce their export volatility through better water control (less dependence on rainfall) and higher efficiency in processing if they are to become dependable exporters in the context of global markets. Another limitation is that our modeling exercise did not address the cost of upgrading groundnut quality. Most developing exporters, except Argentina, face a "quality" challenge for meeting the requirements of the expanding confectionary markets and SPS requirements in OECD markets, Major challenges include adapted research, with an emphasis on yield but also on size and flavor, better access to fertilizer and pesticides, and aflatoxin contamination control.

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Table 1.	Current trade and domestic policy parameters used in the model					
country	commodity	description	unit	99/00	00/01	01/02
ARGENTINA	Peanut	Export tax	% of border price	3.5%	3.5%	3.5%
ARGENTINA	Peanut Meal	Export rebate	%	3.2%	3.2%	3.2%
ARGENTINA	Peanut Oil	Export rebate	%	2.3%	2.3%	2.3%
EU-15 (European Union)	Peanut Oil	Import Tariff	%	6.4%	6.4%	6.4%
EU-15 (European Union)	Peanut Oil	import subsidy for oil from Senegal	%	10.0%	10.0%	10.0%
CHINA	Peanut	Import Tariff	%	30.0%	30.0%	30.0%
CHINA	Peanut	Value Added Tax	%	17.0%	17.0%	17.0%
CHINA	Peanut Meal	Tariff	%	5.0%	5.0%	5.0%
CHINA	Peanut Oil	Tariff	%	9.7%	9.7%	9.7%
CHINA	Peanut Oil	Value Added Tax	%	17.0%	17.0%	17.0%
INDIA	Peanut	Tariff	%	45.0%	45.0%	45.0%
INDIA	Peanut Meal	Tariff	%	45.0%	45.0%	45.0%
INDIA	Peanut Oil	Tariff refined oil	%	35.0%	35.0%	35.0%
REST OF WORLD	Peanut	Tariff	%	5.4%	5.4%	5.4%
REST OF WORLD	Peanut Meal	Tariff	%	0.0%	0.0%	0.0%
REST OF WORLD	Peanut Oil	Tariff	%	0.0%	0.0%	0.0%
CANADA	Peanut	Tariff	%	0.0%	0.0%	0.0%
MEXICO	Peanut	Tariff	%	0.0%	0.0%	0.0%
SENEGAL	Peanut	Tariff	%	5.0%	5.0%	5.0%
SENEGAL	Peanut	Tariff on processed	%	20.0%	20.0%	20.0%
SENEGAL	peanut meal	Tariff	%	0.0%	0.0%	0.0%
SENEGAL	Peanut Oil	Tariff refined oil	%	20.0%	20.0%	20.0%
NIGERIA	Peanut	Tariff	%	0.0%	0.0%	0.0%
NIGERIA	Peanut Meal	Tariff	%	0.0%	0.0%	0.0%
NIGERIA	Peanut Oil	Tariff refined oil	%	0.0%	0.0%	0.0%
REPUBLIC OF SOUTH AFRICA	Peanut	Tariff	%	0.0%	0.0%	0.0%
REPUBLIC OF SOUTH AFRICA	Peanut	Tariff processed peanut food	%	6.0%	6.0%	6.0%
REPUBLIC OF SOUTH AFRICA	Peanut Meal	Tariff	%	0.0%	0.0%	0.0%
REPUBLIC OF SOUTH AFRICA	Peanut Oil	Tariff refined oil	%	0.0%	0.0%	0.0%
MALAWI	Peanut	Tariff	%	5.0%	5.0%	5.0%
MALAWI	Peanut	Tariff processed for consumption	%	25.0%	25.0%	25.0%
MALAWI	Peanut Meal	Tariff	%	0.0%	0.0%	0.0%
MALAWI	Peanut Oil	Tariff refined oil	%	20.0%	20.0%	20.0%
GAMBIA	Peanut	Tariff	%	0.0%	0.0%	0.0%
GAMBIA	Peanut Meal	Tariff	%	0.0%	0.0%	0.0%
GAMBIA	Peanut Oil	Tariff refined oil	%	0.0%	0.0%	0.0%
USA	peanuts	***Out-of-quota tariffs***				
USA	peanuts	shelled out-of-quota tariffs	%	140%	136%	132%
USA	peanuts	in-shell out-of-quota tariffs	%	173%	169%	164%
USA	peanuts	duty-free imports from Mexico	1000 mt	3.9	4.0	4.2
USA	peanuts	***Mexico above-quota tariffs***				
USA	peanuts	shelled peanuts (port price<652$/mt)	$/mt	685.1	665.6	591.6
USA	peanuts	shelled peanuts (port price>652$/mt)	%	105%	102%	99%
USA	peanuts	in-shell peanuts (port price<284$/mt)	$/mt	452.4	439.5	390.6
USA	peanuts	in-shell peanuts (port price>284$/mt)	%	159%	154%	150%
USA	peanuts	***GATT Schedule of US Peanut Imports (shelled basis)***				
USA	peanuts	Argentina	1000 mt	43.9	43.9	43.9
USA	peanuts	Mexico	1000 mt	3.9	4.0	4.2
USA	peanuts	Others	1000 mt	9.0	9.0	9.0
USA	peanuts	Total TRQ	1000 mt	56.8	56.9	57.1
USA	peanuts	Domestic Target Price	$/lb	0.2475	0.2475	0.2475
USA	peanuts	Domestic producer price at qualibration	$/lb	0.254	0.274	0.234
USA	peanuts	Domestic Fixed Payment (fully coupled)	$/lb	0.018	0.018	0.018
USA	peanuts	Domestic loan Rate scaled up 1.1 for annual average	$/lb	0.1775	0.1775	0.1775
USA	Peanut meal	Tariff	%	0%	0%	0%
USA	Peanut oil	Tariff	%	0%	0%	0%

Table 2. Full trade liberalization and removal of US farm policy (FMTL&US scenario)

	new levels after reform			baseline levels			average change
	99/00	00/01	01/02	99/00	00/01	01/02	for 3 years
Peanuts Trade (1000mt)							
Net Exporters							
Argentina	281	227	271	226	177	185	33%
China	-236	-363	-124	540	450	525	-149%
Gambia	13	18	20	8	11	15	55%
India	-88	-140	-74	100	100	125	-196%
Malawi	5	6	5	2	3	3	95%
Nigeria	127	145	145	0	0	0	13900%
Senegal	52	48	33	2	4	5	1390%
South Africa	33	26	41	20	16	35	47%
USA	449	333	365	255	141	231	90%
Total Net Exports	636	299	682	1153	902	1124	-50%
Net Importers							
Canada	106	96	102	116	107	110	-9%
European Union	420	409	434	457	441	463	-7%
Mexico	88	58	64	101	72	75	-16%
Rest of the World	-167	-273	21	290	272	415	-151%
Residual	189	10	61	189	10	61	0%
Total Net Imports	636	299	682	1153	902	1124	-50%
Peanuts Price US Run. 40/50 CIF Rotterda	971	1058	834	820	888	700	19%
Peanut Meal Trade (1000 mt)							
Net Exporters							
Argentina	68	49	52	67	50	52	0%
China	165	182	175	9	15	25	1149%
Gambia	6	11	11	5	10	10	15%
India	-210	-199	-127	10	20	100	-1174%
Malawi	0	0	0	0	0	0	-16%
Nigeria	19	20	25	0	0	0	2138%
Senegal	128	141	138	130	144	140	-2%
South Africa	-4	2	1	-5	0	0	107%
USA	-5	-12	-2	6	5	5	-218%
Rest of the World	41	40	26	8	14	-12	93%
Total Net Exports	208	235	301	230	258	320	-8%
Net Importers							
European Union	164	171	159	186	194	178	-11%
Residual	44	64	142	44	64	142	0%
Total Net Imports	208	235	301	230	258	320	-8%
Meal Price 48/50% CIF Rotterdam $/mt	144	159	148	122	134	125	18%
Peanut Oil Trade (1000 mt)							
Net Exporters							
Argentina	46	40	43	46	41	42	0%
China	63	74	68	0	5	2	3673%
Gambia	3	3	4	0	0	0	343%
India	-87	-74	-105	0	0	0	-8863%
Malawi	0	0	0	0	0	0	-29%
Nigeria	55	54	54	35	35	30	64%
Senegal	93	97	106	98	102	109	-4%
South Africa	1	1	1	0	0	0	129%
USA	-9	-49	-20	2	-30	-10	-126%
Rest of the World	28	14	26	18	11	8	104%
Total Net Exports	193	161	177	199	164	181	-2%
Net Importers							
European Union	144	107	116	150	110	120	-3%
Residual	49	54	61	49	54	61	0%
Total Net Imports	193	161	177	199	164	181	-2%
Peanut Oil Price CIF Rotterdam $/mt	862	800	772	744	685	659	17%
welfare(million dollars)	532	652	502				562

Table 3. Full trade liberalization (FMTL scenario)

	new levels after reform			baseline levels			
	99/00	00/01	01/02	99/00	00/01	01/02	average change for 3 years (%)
Peanuts Trade (1000 mt)							
Net Exporters							
Argentina	281	227	270	226	177	185	33%
China	-240	-365	-132	540	450	525	-150%
Gambia	13	18	20	8	11	15	55%
India	-89	-140	-78	100	100	125	-197%
Malawi	5	6	5	2	3	3	94%
Nigeria	127	145	143	0	0	0	13826%
Senegal	52	48	33	2	4	5	1382%
South Africa	33	26	41	20	16	35	47%
USA	459	336	386	255	141	231	95%
Total Net Exports	640	300	690	1153	902	1124	-50%
Net Importers							
Canada	106	96	102	116	107	110	-9%
European Union	420	409	434	457	441	463	-7%
Mexico	88	58	64	101	72	75	-16%
Rest of the World	-163	-272	28	290	272	415	-150%
Residual	189	10	61	189	10	61	0%
Total Net Imports	640	300	690	1153	902	1124	-50%
Peanuts Price US Run. 40/50, CIF Rott	970	1058	833	820	888	700	19%
Peanut Meal Trade (1000 mt)							
Net Exporters							
Argentina	68	49	52	67	50	52	0%
China	165	182	175	9	15	25	1148%
Gambia	6	11	11	5	10	10	15%
India	-210	-199	-127	10	20	100	-1174%
Malawi	0	0	0	0	0	0	-17%
Nigeria	19	20	25	0	0	0	2135%
Senegal	128	141	138	130	144	140	-2%
South Africa	-4	2	1	-5	0	0	107%
USA	-5	-12	-2	6	5	5	-216%
Rest of the World	41	40	27	8	14	-12	93%
Total Net Exports	208	235	301	230	258	320	-8%
Net Importers							
European Union	164	171	159	186	194	178	-11%
Residual	44	64	142	44	64	142	0%
Total Net Imports	208	235	301	230	258	320	-8%
Meal Price 48/50% CIF Rotterdam $/n	144	159	148	122	134	125	18%
Peanut Oil Trade (1000 mt)							
Net Exporters							
Argentina	46	40	43	46	41	42	0%
China	63	74	68	0	5	2	3666%
Gambia	3	3	4	0	0	0	342%
India	-87	-74	-105	0	0	0	-8876%
Malawi	0	0	0	0	0	0	-29%
Nigeria	55	54	54	35	35	30	64%
Senegal	93	97	106	98	102	109	-4%
South Africa	1	1	1	0	0	0	128%
USA	-9	-49	-20	2	-30	-10	-125%
Rest of the World	28	14	27	18	11	8	106%
Total Net Exports	193	161	177	199	164	181	-2%
Net Importers							
European Union	144	107	116	150	110	120	-3%
Residual	49	54	61	49	54	61	0%
Total Net Imports	193	161	177	199	164	181	-2%
Peanut Oil Price CIF Rotterdam $/mt	861	800	772	744	685	659	17%
welfare(million dollars)	531	653	494				559

Table 4. Peanut trade liberalization and removal of US peanut program (GMTL&US scenario)

	new levels after reform			baseline levels			
	99/00	00/01	01/02	99/00	00/01	01/02	average change for 3 years
Peanuts Trade (1000 mt)							
Net Exporters							
Argentina	292	239	300	226	177	185	42%
China	-220	-346	-135	540	450	525	-148%
Gambia	15	20	21	8	11	15	68%
India	-420	-474	-339	100	100	125	-488%
Malawi	4	5	4	2	3	3	72%
Nigeria	151	168	170	0	0	0	16270%
Senegal	44	42	28	2	4	5	1171%
South Africa	33	26	41	20	16	35	49%
USA	501	387	409	255	141	231	116%
Total Net Exports	401	66	499	1153	902	1124	-71%
Net Importers							
Canada	107	97	102	116	107	110	-8%
European Union	419	408	435	457	441	463	-7%
Mexico	88	58	65	101	72	75	-15%
Rest of the World	-403	-507	-164	290	272	415	-222%
Residual	189	10	61	189	10	61	0%
Total Net Imports	401	66	499	1153	902	1124	-71%
Peanuts Price US Run. 40/50, CIF Rotterdam $/t	964	1051	823	820	888	700	18%
Peanut Meal Trade (1000 mt)							
Net Exporters							
Argentina	62	45	43	67	50	52	-11%
China	49	56	63	9	15	25	290%
Gambia	5	10	10	5	10	10	-3%
India	96	124	171	10	20	100	482%
Malawi	0	0	0	0	0	0	-7%
Nigeria	-3	-3	-3	0	0	0	-316%
Senegal	127	140	138	130	144	140	-2%
South Africa	-5	0	0	-5	0	0	-10%
USA	-37	-44	-32	6	5	5	-809%
Rest of the World	-62	-67	-69	8	14	-12	-326%
Total Net Exports	231	260	321	230	258	320	0%
Net Importers							
European Union	187	196	179	186	194	178	1%
Residual	44	64	142	44	64	142	0%
Total Net Imports	231	260	321	230	258	320	0%
Peanut Meal Price 48/50% CIF Rotterdam	123	135	126	122	134	125	1%
Peanut Oil Trade (1000 mt)							
Net Exporters							
Argentina	43	37	36	46	41	42	-10%
China	35	41	34	0	5	2	1939%
Gambia	0	0	0	0	0	0	5%
India	63	76	54	0	0	0	6423%
Malawi	0	0	0	0	0	0	0%
Nigeria	32	31	27	35	35	30	-10%
Senegal	95	99	107	98	102	109	-2%
South Africa	0	0	0	0	0	0	-2%
USA	-32	-68	-39	2	-30	-10	-421%
Rest of the World	-37	-52	-37	18	11	8	-479%
Total Net Exports	199	165	181	199	164	181	0%
Net Importers							
European Union	150	111	120	150	110	120	1%
Residual	49	54	61	49	54	61	0%
Total Net Imports	199	165	181	199	164	181	0%
Peanut Oil Price CIF Rotterdam $/mt	756	698	670	744	685	659	2%
welfare (million dollars)	633	758	568				653

Table 5. Impact of peanut trade liberalization (GMTL scenario)

	new levels after reform			baseline levels			average change
	99/00	**00/01**	**01/02**	**99/00**	**00/01**	**01/02**	for 3 years
Peanuts Trade							
Net Exporters							
Argentina	292	239	299	226	177	185	42%
China	-224	-348	-143	540	450	525	-149%
Gambia	15	20	21	8	11	15	68%
India	-421	-474	-342	100	100	125	-490%
Malawi	4.0	5.2	4.3	2	3	3	71%
Nigeria	150	167	168	0	0	0	16191%
Senegal	44	42	27	2	4	5	1163%
South Africa	33	26	41	20	16	35	49%
USA	512	390	431	255	141	231	121%
Total Net Exports	405	67	507	1,153	902	1,124	-71%
Net Importers							
Canada	107	97	102	116	107	110	-8%
European Union	419	408	435	457	441	463	-7%
Mexico	88	58	65	101	72	75	-15%
Rest of the World	-398	-505	-157	290	272	415	-220%
Residual	189	10	61	189	10	61	0%
Total Net Imports	405	67	507	1,153	902	1,124	-71%
Peanuts Price: US Runners 40/50, CIF Rotterc	963	1,051	822	820	888	700	18%
Peanut Meal Trade							
Net Exporters							
Argentina	62.48	44.74	43.45	67.00	50.00	52.00	-11%
China	48.92	56.35	62.30	9.00	15.00	25.00	290%
Gambia	4.78	9.71	9.85	5.00	10.00	10.00	-3%
India	95.46	123.48	170.79	10.00	20.00	100.00	481%
Malawi	-0.08	-0.08	-0.04	0.00	0.00	0.00	-7%
Nigeria	-3.09	-3.43	-3.04	0.00	0.00	0.00	-318%
Senegal	126.68	139.86	137.69	130.00	144.00	140.00	-2%
South Africa	-5.12	-0.24	-0.09	-5.00	0.00	0.00	-10%
USA	-36.80	-43.78	-31.42	6.00	5.00	5.00	-806%
Rest of the World	-61.78	-66.96	-68.71	8.00	14.00	-12.00	-326%
Total Net Exports	231.45	259.66	320.79	230.00	258.00	320.00	0.5%
Net Importers							
European Union	187	196	179	186	194	178	1%
Residual	44	64	142	44	64	142	0%
Total Net Imports	231	260	321	230	258	320	1%
Peanut Meal Price: 48/50% CIF Rotterdam	123	135	126	122	134	125	0.5%
Peanut Oil Trade							
Net Exporters							
Argentina	43	37	36	46	41	42	-10%
China	35	41	33	0	5	2	1933%
Gambia	0.02	0.00	0.11	0	0	0	4%
India	63	76	53	0	0	0	6402%
Malawi	-0.014	-0.010	0.007	0.000	0.000	0.000	-1%
Nigeria	32	31	26	35	35	30	-10%
Senegal	95	99	107	98	102	109	-2%
South Africa	0	0	0	0	0	0	-3%
USA	-31	-68	-39	2	-30	-10	-420%
Rest of the World	-37	-51	-37	18	11	8	-477%
Total Net Exports	200	165	182	199	164	181	0%
Net Importers							
European Union	151	111	121	150	110	120	1%
Residual	49	54	61	49	54	61	0%
Total Net Imports	200	165	182	199	164	181	0%
Peanut Oil Price: CIF Rotterdam	756	697	669	744	685	659	1.7%
Welfare	632	759	561				651

Table 6. Impact of China and India full liberalization (CIFTL scenario)

	New levels after reform			baseline levels			average change
	1999/2000	2000/01	2001/02	1999/2000	2000/01	2001/02	for 3 years (%)
Peanuts Trade							
Net Exporters							
Argentina	261	210	233	226	177	185	20%
China	-366	-510	-235	540	450	525	-175%
Gambia	12	17	20	8	11	15	47%
India	-127	-183	-110	100	100	125	-233%
Malawi	10	10	10	2	3	3	284%
Nigeria	108	124	124	0	0	0	11891%
Senegal	39	44	32	2	4	5	1137%
South Africa	32	25	41	20	16	35	45%
USA	428	307	364	255	141	231	81%
Total Net Exports	398	45	478	1153	902	1124	-73%
Net Importers							
Canada	107	97	103	116	107	110	-8%
European Union	426	414	439	457	441	463	-6%
Mexico	89	59	65	101	72	75	-14%
Rest of the World	-414	-536	-189	290	272	415	-228%
Residual	189	10	61	189	10	61	0%
Total Net Imports	398	45	478	1153	902	1124	-73%
Peanuts Price US Run. 40/50, CIF Rotterdam $/mt	951	1037	818	820	888	700	17%
Peanut Meal Trade							
Net Exporters							
Argentina	71	52	56	67	50	52	6%
China	168	186	178	9	15	25	1173%
Gambia	6	11	11	5	10	10	15%
India	-206	-194	-124	10	20	100	-1151%
Malawi	0	0	0	0	0	0	18%
Nigeria	19	20	26	0	0	0	2154%
Senegal	140	154	147	130	144	140	7%
South Africa	-4	2	1	-5	0	0	108%
USA	0	-6	2	6	5	5	-129%
Rest of the World	13	9	2	8	14	-12	-30%
Total Net Exports	207	234	300	230	258	320	-8%
Net Importers							
European Union	163	170	158	186	194	178	-12%
Residual	44	64	142	44	64	142	0%
Total Net Imports	207	234	300	230	258	320	-8%
Meal Price 48/50% CIF Rotterdam $/mt	144	159	148	122	134	125	18%
Peanut Oil Trade							
Net Exporters							
Argentina	47	42	46	46	41	42	5%
China	63	73	68	0	5	2	3650%
Gambia	3	3	4	0	0	0	328%
India	-87	-74	-106	0	0	0	-8920%
Malawi	1	1	1	0	0	0	103%
Nigeria	54	54	54	35	35	30	63%
Senegal	106	113	117	98	102	109	9%
South Africa	1	1	1	0	0	0	124%
USA	-5	-45	-17	2	-30	-10	-81%
Rest of the World	4	-11	6	18	11	8	-100%
Total Net Exports	188	157	173	199	164	181	-5%
Net Importers							
European Union	139	103	112	150	110	120	-7%
Residual	49	54	61	49	54	61	0%
Total Net Imports	188	157	173	199	164	181	-5%
Peanut Oil Price CIF Rotterdam $/mt	855	793	767	744	685	659	16%
Welfare effects (million $)	595	721	534	-	-	-	617

Table 7. Welfare effects of policy scenarios in million dollars at 1995 prices (average 1999-2001)

Country	FMTL&US	FMTL	GMTL&US	GMTL	CIFTL
argentina	24	24	21	21	20
EU-15	-77	-77	-75	-75	-83
China	361	362	347	349	416
India	147	148	166	167	162
Rest of the world	14	13	108	107	54
Canada	-11	-11	-11	-10	-10
Mexico	-14	-14	-13	-13	-12
Senegal	38	38	26	26	16
Nigeria	22	22	19	19	19
South Africa	3	3	3	3	2
Malawi	7	7	7	7	-2
Gambia	1	1	1	1	1
USA	47	42	53	48	36
Africa-5 total[1]	72	72	57	56	35
Total	562	559	653	651	617

1. Denotes the aggregate of Senegal, Nigeria, South Africa, Malai, and the Gambia.